0127-090P

No. **404 916**	**Patent**	No. **404 916**
SWISS FEDERATION FEDERAL OFFICE FOR INTELLECTUAL PROPERTY	Classification Int. Cl:	**35 a, 6** **B 66 b**
	Application number: Application date:	13620/63 November 6, 1963, 5 p.m.
	Patent issued: Patent published	December 31, 1965 July 15, 1966

MAIN PATENT

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HANDRAIL DRIVING MECHANISM FOR ESCALATORS AND DRIVING RAMPS

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The invention relates to a handrail driving mechanism for escalators and driving ramps, which enables the balustrade casing surface to be constructed as a transparent surface.

Previous driving mechanisms for the handrails of escalators are disposed in the balustrade and are hidden from sight by the casing surfaces of the balustrade. For this purpose, the casing surfaces are not transparent, so that the escalator has a shaft-like appearance and cannot be blended harmonically into the room architecture. Encasing the balustrade in reflecting surfaces was hardly able to provide a remedy for this disaster. Moreover, clamping devices, which are required for the satisfactory guidance of a handrail, subject it to alternating stresses and, with that, contribute to rapid wear.

Pursuant to the invention, these disadvantages and deficiencies of previous handrail driving mechanisms can be eliminated by a plurality of friction rollers arranged in series, which, acting on either side of the handrail in pairs, drive the handrail synchronously with the speed of the escalator or the ramp. For producing the frictional pressure required for the travel of the handrail, one of the pair of rollers, constructed as a counter-pressure roller, can be under an adjustable pressure and the driving rollers can be driven by means of a roller chain by the main drive shaft or by the deflection shaft.

The essentials of the invention are shown in the drawing by means of an example and

Figure 1 diagrammatically represents a balustrade of an escalator with an inventive driving mechanism for the handrail,

Figure 2 also diagrammatically, shows an inventive driving unit for the handrail and

Figure 3 shows a different embodiment of the inventive driving unit,

Figure 4 shows a section through a pair of rollers of the driving unit with a counter-pressure roller, which is not driven,

Figure 5 shows a section through a pair of rollers with a driven counter-pressure roller in the driving unit,

Figure 6 shows a section through a pair of rollers of a driving device of Figure 3 and

Figure 7 shows a cross section through the deflection curve of a handrail, as shown in Figure 1.

As explained above and shown in Figure 1, the handrail 12, pursuant to the invention, is driven over a friction roller unit 1. In an embodiment, given by way of example, the friction roller unit 1 comprises a plurality of friction rollers, which are disposed in series and act on either side of the handrail in pairs. At least several of the friction rollers are driven synchronously. These driving wheels can be driven by means of a roller chain 3 and a tensioning wheel 5 by the lower deflection shaft 2 or by the upper main drive shaft. In Figure 1, they are driven by the lower deflection shaft 2 and guiding rollers 6 are disposed in the upper end region of the escalator for guiding the handrail 12. The other driving mechanism of the roller unit 1, by means of which (the driving wheels are driven) by the main driving shaft in the upper region, is not shown, since the relationships are similar to those shown, the only exception being that the driving unit 1 with the driving shaft 2 is disposed in the upper region of the escalator and the guide rollers 6 in the lower region.

The driving unit 1, together with the driving device 2, 3, 5 and the guide rollers 6 are accommodated in the lateral casing 4 of the escalator and therefore are not visible.

As is customary, the handrail 12 is turned back in a relatively large curve at the lower reversing site 14 and at the upper reversing site 15. At these reversing sites 14 and 15, the handrail 12 is pressed fairly strongly against the handrail guide, so that there is much friction at these sites. Since the handrail is driven over friction wheels, provisions must be made to keep the friction at these sites as low as possible. Pursuant to the invention, this is accomplished by a series of small friction rollers 16, which are constructed as small as possible as guide rollers, so that they are covered completely by the side profiling of the handrail. Other bending sites in the guidance of the handrail are also equipped in this manner.

Since the previously customarily large handrail deflection wheels at the reversing sites 14 and 15 are now omitted in this manner and the driving mechanism for the handrail is accommodated in the casing of the escalator, it is no longer necessary for the balustrade casing to be opaque. Instead, it can now be produced from a translucent or transparent material and it is possible to illuminate the balustrade from inside, so that the escalator can be constructed light and bright and adapted to any modern interior architecture.

Figures 2 to 7 represent technical embodiments of the driving unit and of other parts.

Figure 2 shows a simple friction roller unit, which is adequate for shorter escalators. A row of friction rollers 8 and 8a is disposed in pairs on either side of the handrail 12, so that the rollers 8, 8a of each pair are under pressure when the handrail 12 is located between then. For the driving mechanism, a roller chain 3 is placed in meandering fashion around all driving wheels of the friction rollers 8, 8a, which are driven by the drive shaft over the deflection rollers 5. The driving mechanisms must be stepped up or stepped down to such an extent, that the friction rollers 8, 8a drive the handrail 12 synchronously with the escalator speed. The distance between a roller 8 and its counter-roller must be adjusted so that the friction not only is adequate for driving the handrail, but also takes into consideration the additional stresses, caused by the passengers when the escalator is in the process of being stopped. On the other hand, the contacting pressure must not be so large, that the handrail, produced from an elastic material, is stressed excessively and subjected to excessive wear. The greater the number of friction roller pairs that are provided, the easier it is to fulfill these conditions. Nevertheless, especially in the case of large installations, it may be difficult to configure the distance between the friction rollers optimally from the very start, since the material of the handrail itself, in the final analysis, is also a factor.

A driving unit with adjustable friction between the handrail and the driving wheels is shown diagrammatically in Figure 3. In each pair of rollers, a driving roller is replaced by a counter-pressure roller 11, which is not driven, driving roller 8 and counter roller 11 alternating on each handrail side. Once again, the driving roller 8 can be driven synchronously by means of a roller chain 3.

The counter-pressure rollers 11 are mounted elastically, the contacting pressure of each counter-pressure roller 11 being regulated by means of an adjusting device 13 in accordance with local conditions. As a result, a uniform tractive power at the handrail is achieved.

In Figures 4, 5 and 6, practical embodiments of the inventive driving unit are shown in section.

Figures 4 and 5 are sectional representations of the arrangement and installation of a pair of rollers of a driving unit with counter-pressure rollers, which are not driven.

Driving wheels 8 are disposed rotatably on each mounting plate and each driving wheel 8 is connected rigidly with a roller drive wheel 7, the teeth of which are engaged by the roller chain 3. The counter-pressure roller 11 is fastened rotatably at a supporting part 10, which slides in a guide 10a, which is mounted at the mounting plate. The tension of a spring 9, disposed between the supporting part 10 and a lug at the mounting plate, can be adjusted by a screw 13. The spring 9 presses the supporting part 10 with the counter-pressure roller 11 into the guide 10a in the direction of the drive wheel 8. The handrail 12 runs between the two wheel disks 8 and 11. The peripheral surface of the two wheel disks may be profiled or covered with a non-slip plastic, so that, together with the contacting pressure of the counter-pressure roller, there is sufficient friction for driving the handrail 12.

Figure 6 is a sectional representation through a pair of rollers, the two wheels 8 and 8a of which are driven. The one drive wheel 8, functioning as a counter-pressure wheel, once again can be mounted displaceably in a guide and pressed by a spring against the other wheel 8.

The devices, regulating the contacting pressure of the counter roller, need not be springs, as shown; any other appropriate device may be used, such as, for example, a device with counter-weights.

Finally, Figure 7 shows sectional representations of the guide of the handrail 12 in the deflection curves 14 and 15 (Figure 1). The deflection rollers 16 are covered at the side by the profile of the handrail and the roller 16 can be rotated easily so that, as already mentioned, the friction, which is high particularly at these sites, can be eliminated as far as possible, the load on the driving mechanism of the handrail thus being largely relieved.

The deficiencies of previous handrail driving mechanisms, listed above, are eliminated by the inventive handrail driving mechanism and, because the balustrade surface is kept free, the possibility is provided of closing this surface off impressively and appropriately.

Claim

Handrail driving mechanism for escalators and driving ramps, characterized by a plurality of friction rollers, which are disposed in series on either side of the handrail, act in pairs and drive the handrail synchronously with the driving speed of the escalator or ramp.

Dependent Claims

1. The handrail driving mechanism of the claim, characterized in that one roller of each pair of rollers is constructed as a counter-pressure roller for producing the frictional pressure required for the forward movement of the handrail under an adjustable pressure.

2. The handrail driving mechanism of the dependent claim 1, characterized in that a drive roller and a counter-pressure roller are disposed alternately on one side of the handrail in the driving unit, which consists of roller pairs connected in series.

3. The handrail driving mechanism of the dependent claim 2, characterized in that the drive rollers are disposed, so that they can be driven from the main drive shaft with a roller chain.

4. The handrail driving mechanism of the dependent claim 2, characterized in that the drive rollers are disposed so that they can be driven by the deflector shaft with a roller chain.

5. The handrail driving mechanism of the main claim and of the dependent claims 1 to 4, characterized by a series of smaller rollers, which are disposed at the deflection curves in the supporting profile of the handrail and decrease the frictional losses to such an extent, that the frictional pressure, produced by the counter-rollers, can be adjusted to a minimum.